

STATUS REVIEW OF LESQUERELLA SP. NOVUM

BUTTE DISTRICT

BUREAU OF LAND MANAGEMENT

MONTANA

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I. SUMMARY

This study was initiated as a survey for Lesquerella carinata, a species endemic to portions of Idaho, Wyoming and Montana. The species was collected in the Centennial Mountains and in the East Pioneer Mountains on lands administered by the Bureau of Land Management, within the Dillon Resource Area of the Butte District.

Collection sites were revisited and collections were made of the reported Lesquerella carinata, but they did not key to Lesquerella carinata in the genus monograph (Rollins and Shaw 1973). Their identity had previously been called into question (Schassberger 1991, Rollins pers. commun. to Schassberger 1992). Expanded collecting and taxonomic consultation with Dr. Reed C. Rollins were added to the survey work. Following the field season, specimens were sent for verification, and determination was made that they represent an undescribed species of Lesquerella (Rollins pers. commun.) The following report gives detailed information on the new species of Lesquerella sp. novum whose known range lies entirely within the Butte District in Montana. Throughout this report, Lesquerella sp. novum is used in place of Lesquerella carinata.

Included within L. sp. novum circumscription is material previously treated as Lesquerella paysonii. It had been collected at a single site on Deerlodge National Forest, and sent to Dr. Rollins for identification. Consequently, this report signifies an update to an earlier report on L. paysonii (Schassberger 1991).

Survey results characterize the geographic range of Lesquerella sp. novum and breadth of habitat, and represent partial survey of population numbers and boundaries. Eight records are known to date, ranging ca. 100 miles from the Centennial Mountains to the Sapphire Mountains, and spanning 5600-9600' elevation in open habitats at either elevation extreme. Three new records were found in foothills south of the Pioneer Mountains.

It is restricted to localized conditions within this range, most highly restricted by edaphic conditions as a calciphile. Nearly all populations are on Madison Group limestone, which is found in intermittent bands in southwestern Montana. It is further restricted to plant community associations as found at the high and low ends of its elevation range where groundcover is open and competition reduced. Foothills populations are in dry Agropyron spicatum communities or Cercocarpus ledifolius communities. Upper elevation populations are in dry grassland or open parkland.

The habitat corresponds with active metal mining activity. Recommendations for maintaining populations include a check on mine permitting at documented sites. Information on population numbers and boundaries is incomplete so management recommendations are contingent on assessment needs that include: population demarcation at six of the eight sites; survey for new populations in at least the Centennial Mountains, and the East Pioneer Mountains and foothills; and a status review update pending assessment and publication in the literature.

II. INTRODUCTION

Increased taxonomic work on members of the Mustard Family (Brassicaceae) has been in progress in Montana over the past decade by Dr. Reed C. Rollins, Harvard University, emphasizing the Lesquerella and Draba genera. The former includes five endemic Lesquerella taxa known only from Montana (Rollins 1984, Rollins pers. commun.), representing the highest level of endemism among plant genera in Montana. Survey work has been conducted for the first three species to determine their distribution and status, as cited below. They include:

<u>Species</u>	<u>Survey report</u>
<u>Lesquerella humilis</u> Rollins, found only in the Bitterroot Mountains	Shelly 1988 Achuff and Shelly 1990
<u>Lesquerella klausii</u> Rollins, found only in the Big Belt and Blackfoot Range	Shelly 1988 Poole and Heidel 1993
<u>Lesquerella carinata</u> , with description of an endemic variety in progress; from the Garnet Range	Schassberger 1991
<u>Lesquerella</u> sp. novum, recently collected in the Pryor Mountains	-
<u>Lesquerella</u> sp. novum, collected in the Pioneer, Centennial and Sapphire Mountains	Subject of this report

The Lesquerella sp. novum of southwest Montana was originally identified as L. carinata and was the stated target of this survey project. The following report gives detailed information on this new taxa, as surveyed on BLM lands. It also includes information from two national forests where it was previously collected.

III. METHODS

Information on locations of Lesquerella carinata in Beaverhead County was obtained from herbarium specimens, the Montana Natural Heritage Program database, and vegetation sampling work which included documenting plant material from two previously reported sites for the species (DeVelice 1992).

Lesquerella carinata had been surveyed and studied elsewhere in southwestern Montana at low elevation sites along the Granite Range and the Sapphire Mountains (Schassberger 1991). It is restricted to substrate from Mission Canyon limestone of the Madison Group. Two other rare species of Lesquerella are described from Montana (Rollins

1984); Lesquerella klausii is restricted to Belt Group substrate in a limited portion of the Big Belt Mountains and Blackfoot Range (Shelly 1988) and is substrate-specific. Lesquerella humilis is found only in the Bitterroot Mountains of Montana and may also be substrate-restricted (Achuff 1990). Based on this information, the survey was planned around the hypothesis that the survey target is restricted to areas having surface geology corresponding to the known sites. Surface geology information from Ross et al. (1955) was overlain with BLM maps to identify six primary areas for survey work (Figure 1).

Field surveys were completed as follows:

B. L. Heidel 24-26 June 1992
B. L. Heidel 5-6 August 1992

Survey work of other botanists is cited in this report, conducted under separate studies:

L. S. Roe 11-13 June 1990

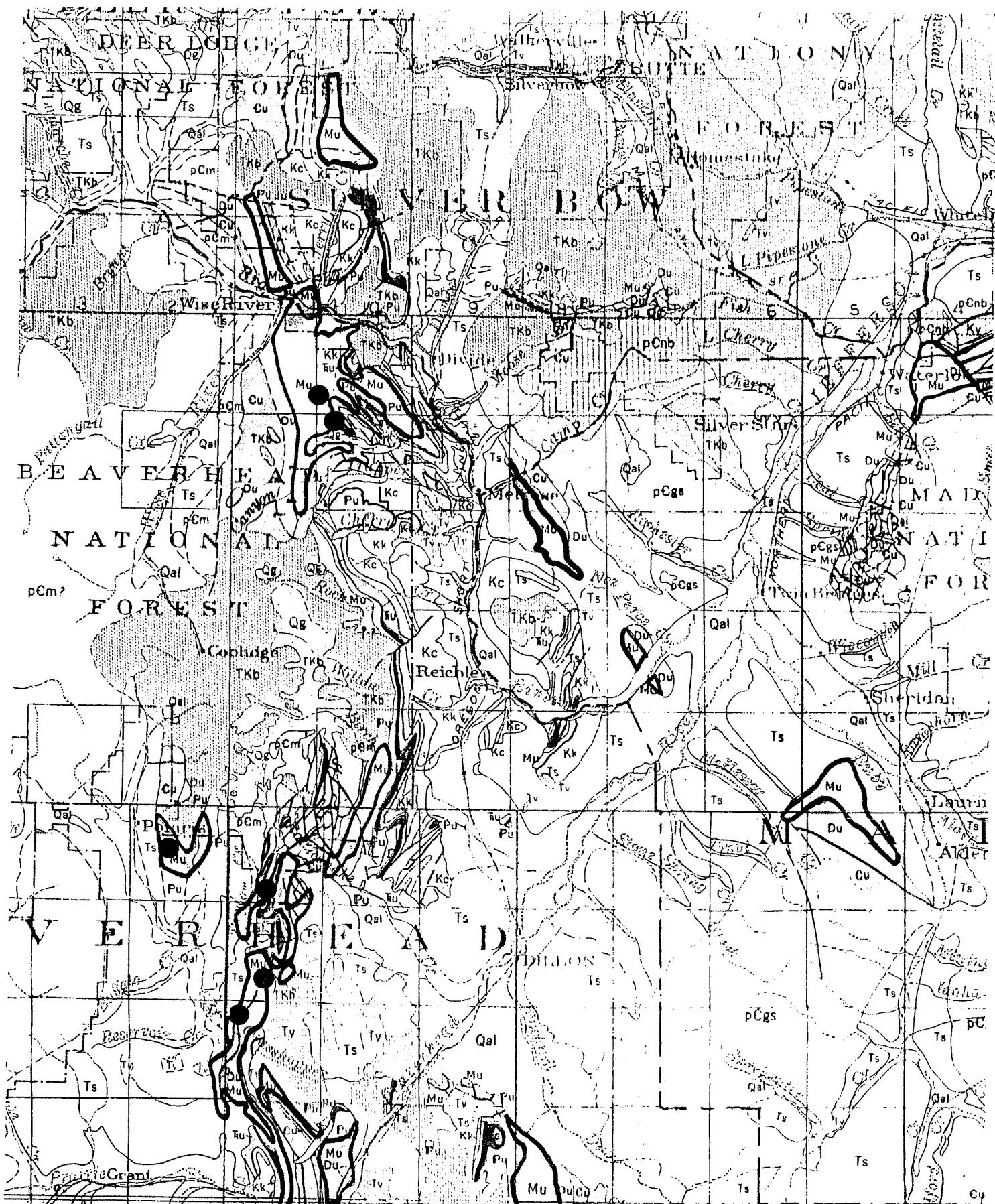
P. Lesica and S. Cooper 24-25 June 1991

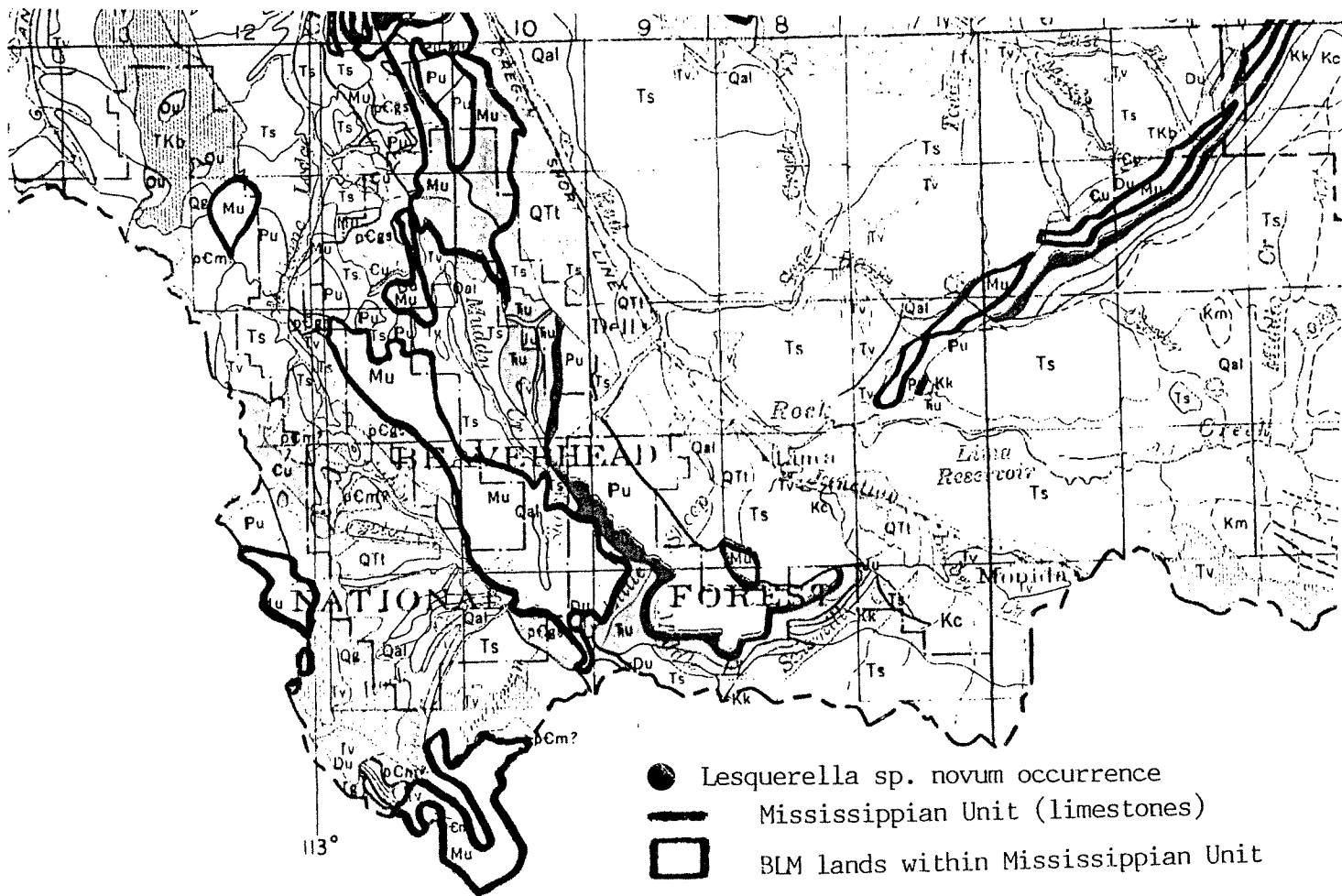
The primary survey purpose was to characterize species distribution across the range of suitable habitat, and the secondary purposes involved building a body of species information and mapping populations and subpopulations.

Throughout this report, the three-digit occurrence numbers are indicated in parentheses after the site names, e.g. Scudder Creek (002). These correspond to the occurrence numbers provided in the tables, element occurrence printouts and maps.

Figure 1.

SURFACE GEOLOGY MAP OF SOUTHWESTERN MONTANA
Showing all Lesquerella sp. novum sites on limestone
(From Ross et. al 1955)





III. SPECIES INFORMATION: The following information on Lesquerella sp. novum represents survey results and acquired background data.

A. CLASSIFICATION

1. SCIENTIFIC NAME: Lesquerella sp. novum

Monographic work by Dr. Reed C. Rollins, Harvard University, will determine species nomenclature (Rollins in progress).

2. COMMON NAME: Will be based on scientific name.

3. FAMILY: Brassicaceae.

4. GENUS: Lesquerella; presumed to be in same group with L. carinata in Lesquerella "Group 8" of Rollins and Shaw (1973), a set of species having obcompressed siliques.

5. SPECIES: Referred to as "sp. novum" (lat. new species) until such time as species epithet is published in monographic work by Dr. Rollins (in progress).

The first known collection of the species was from Emerine Gulch in the foothills of the Sapphire Mountains, Deerlodge County, made by L. Harvey in 1966 (Harvey (7226) MONTU) which was determined by Klaus Lackschewitz to be Lesquerella carinata Rollins. It was recollected by Peter Lesica in 1986 (Lesica (3751) GH), and originally identified as L. carinata by Dr. Rollins. The Lesica collection and subsequent collections by Lisa Schassberger Roe (Schassberger (368) GH) were redetermined by Dr. Rollins to be L. paysonii Rollins. Closer examination in the course of monographic work lead them to be treated by Dr. Rollins as a new species (Rollins pers. commun.).

Note: The only documentation of putative L. paysonii in Montana was based on the Emerine Gulch material, which is now treated as L. sp. novum, and which is no longer recognized under the former name in the Montana flora (USFS 1993). This taxonomic treatment has bearing on previous status information for L. paysonii in the state (Schassberger 1991).

The second known collection site of the species was in the Nemesis Mountain area made by Porter Lowry in 1979 (Lowry (2090) MONT) and also originally identified as Lesquerella carinata.

6. **VARIETY:** All material covered in this report is being treated as the same species, without variety distinctions. It was noted that the foothills plants are consistently smaller than the upper elevation plants (Heidel pers. obs.) but they are not otherwise distinguished (Rollins pers. commun.).

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. FEDERAL STATUS

a. U.S. FISH AND WILDLIFE SERVICE: None at present.

Lesquerella carinata had been the identification made for the first two collections of L. sp. novum, and under this name it was included in Category 3C (USDI Fish and Wildlife Service 1985). L. carinata was placed in the 3C category when it was found to be more common in south-central Idaho than previously known. The recognition of a new taxa has no bearing on L. carinata status, nor does L. carinata status have bearing on that of L. sp. novum.

Copies of this report will be provided to the Regional Office of the U.S. Fish and Wildlife Service for consideration. It is recommended for status review contingent on results of the 1993 field season, and after it has been described as a new species.

b. BUREAU OF LAND MANAGEMENT: None at present. Lesquerella carinata had been the identification made for the two Beaverhead County collections of L. sp. novum, and under this name it was included as a proposed sensitive plant on the draft Bureau of Land Management list of sensitive species (USDI 1993). The recognition of a new taxa has no bearing on the status of L. carinata, which is also known from BLM land in the Garnet Range. This report addresses status considerations for L. sp. novum.

b. U.S. FOREST SERVICE: The U.S. Forest Service list of sensitive species for Region 1 (Northern Region) currently includes Lesquerella paysonii as sensitive and L. carinata as watch (Lesica and Shelly 1991). Designation of L. paysonii as sensitive was based strictly on material which has been redetermined to be L. sp. novum. Therefore it would be appropriate to delete L. paysonii and add L. sp. novum to the U.S. Forest Service list.

The recognition of a new taxa has no bearing on the status of L. carinata. Copies of this report will be provided to the Regional Office of the U.S. Forest Service for consideration.

2. **STATE:** Lesquerella sp. novum has been added to the list of Montana state plant species of special concern. This does not signify an official designation or legal protection, but rather a recognition of need for information tracking. It is considered state- and globally-imperiled (G2S2) because it is known from a rangewide and statewide total of eight occurrences.

C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Lesquerella sp. novum is a low-growing member of the Brassicaceae (Mustard Family) with bright four-petaled yellow flowers at the ends of one to many stems lying close to the ground (Figures 3, 4). It has a cluster of basal rosette leaves shaped like a spade, and inconspicuous stem leaves much reduced in size. A dense cover of short, branched, appressed hairs gives the leaves and stem a silvery appearance.

Fruit material is needed for definitive identification. Fruits are flattened at right angles to the plane joining the halves.

2. **TECHNICAL DESCRIPTION:** Taxonomic work by Dr. Rollins will provide complete technical description (Rollins in progress). Detailed description is wanting. Lesquerella sp. novum is a short-lived perennial, densely pubescent, with many-rayed trichomes; stems less than 10 cm.; basal leaves less than 3 cm. long, the blade deltoid with an obtuse tip, narrowing gradually to the petiole; the petiole tapering from the leaf blade to the petiole base. Siliques obovoid.

In Dorn (1984), Lesquerella sp. novum keys out to L. carinata because it has obcompressed fruits, i.e. flattened at right angles to the partition separating the two locules. Unlike L. carinata, L. sp. novum does not have raised ridges at the suture joining the locules.

In Rollins and Shaw (1973), Lesquerella sp. novum keys out to the Key III species group of Lesquerella because it has obcompressed fruits. Within Key III, it keys out to Lesquerella prostrata Nelson. Its distinguishing features include sigmoid pedicels,

Figure 2. CLOSE-UP PHOTO OF LESQUERELLA SP. NOVUM (BADGER PASS - #006)



Figure 3. CLOSE-UP PHOTO OF LESQUERELLA SP. NOVUM (NEMESIS MT. - #004)



length of some of the lowermost leaves more than 5 mm with a distinct angular blade and a petiole, the siliques ovoid but not gibbous and not compressed at the apex or margins, the ovules two per locule, and its low spreading stems and spreading trichomes.

Unlike L. prostrata, L. sp. novum has markedly obcompressed siliques, the petal margins are not undulate, and the stem is shorter than 1.0 dm, being less prostrate.

3. **LOCAL FIELD CHARACTERS:** There are no other species of Lesquerella overlapping the range of Lesquerella sp. novum that also have obcompressed fruits. The geographically closest species with this characteristic is Lesquerella carinata in the Garnet Range, Granite County. As stated previously, L. sp. novum does not have raised ridges at the suture joining the locules as does L. carinata.

It is sympatric with Lesquerella alpina, which has similar-looking flowers that flower at the same time. L. alpina, however, has erect flowering stems, and very narrowly oblanceolate leaves, without a distinction between the leaf blade and petiole.

Plants are easiest to locate in flower, although fruit material is needed for positive identification. Flowering and fruiting overlap over much of the flowering period because flowering is staggered within and between stems (see phenology).

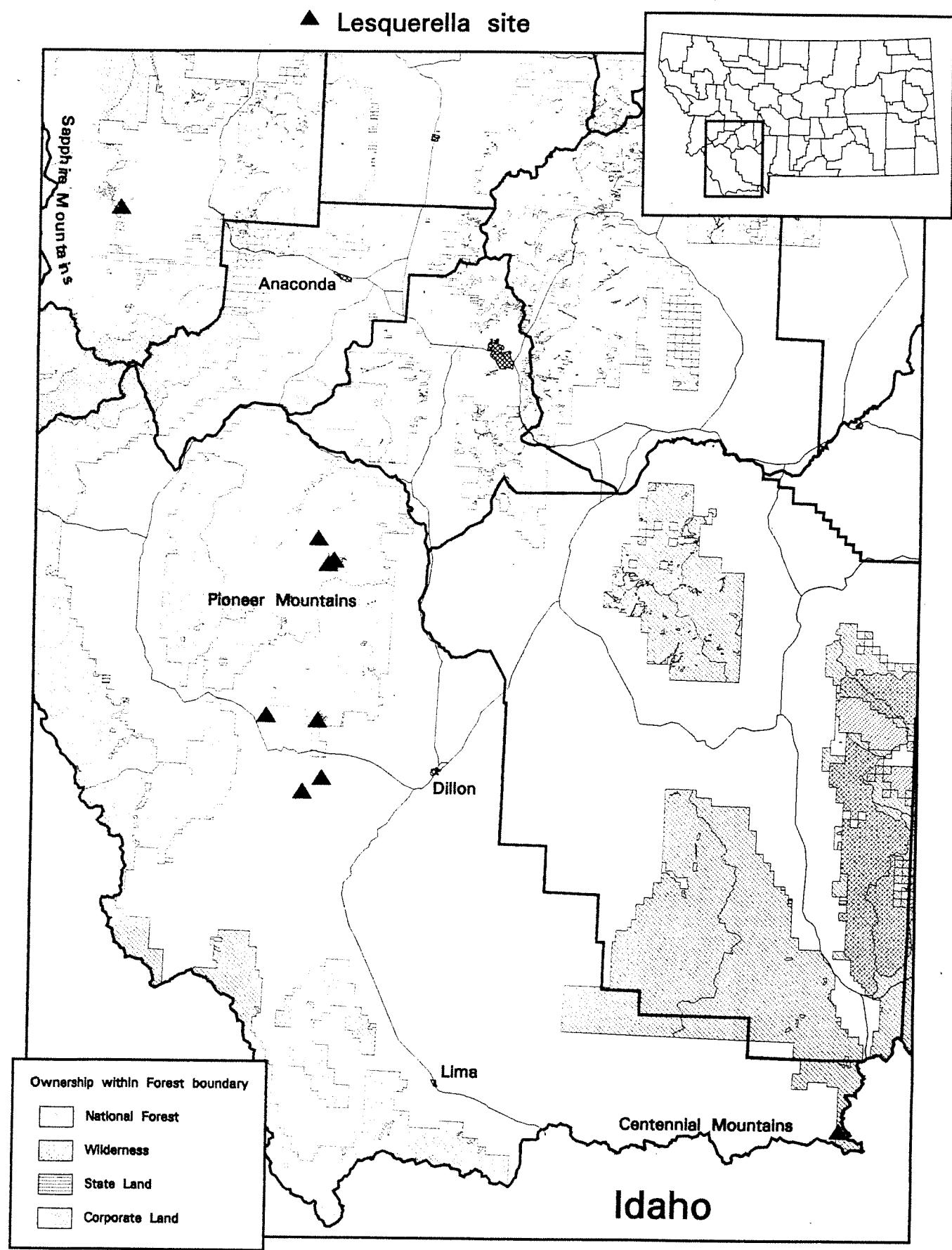
D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Lesquerella sp. novum is known from eight areas in Beaverhead and Deerlodge Counties of southwestern Montana (Figure 2). Known sites are centered around the Pioneer Mountains and foothills. There are also single sites where the species has been collected in the Centennial Mountains (Nemesis Mountain area) and in the Sapphire Mountains (Emerine Gulch; also called West Butte).
2. **CURRENT SITES:** All eight records and maps of L. sp. novum sites are presented in Figure 2, and detailed in Appendix B and C, respectively.
3. **HISTORICAL SITES:** NA
4. **UNVERIFIED/UNDOCUMENTED REPORTS:** None.

Figure 4.

Occurrences of *Lesquerella* sp. novum

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5. **AREAS SURVEYED BUT SPECIES NOT LOCATED:** Preliminary surveys were conducted in several areas that produced no results: southeast end of the Tendoy Mts., southwest of the Snowcrest Range, north of the East Pioneers, and north of Clark Canyon Reservoir. The Centennial Mountains were also searched unsuccessfully west of the documented site, above the Odell Basin. The list of sites search unsuccessfully is listed in Appendix 1.

Surveys were not conducted in Deerlodge County on BLM lands near Emerine Gulch because the project scope was set within the Dillon Resource Area and because the Lesquerella sp. novum site in Deerlodge County was considered to represent a different species at the time fieldwork was conducted. This presents a gap in survey coverage.

In addition, population boundary information is incomplete for six of the eight documented records, which include:

- 002 Scudder Creek
- 003 Bannack
- 005 Black Mountain Road
- 006 Badger Pass
- 007 Black Lion Mountain
- 008 Lion Mountain

E. HABITAT

1. **ASSOCIATED VEGETATION:** The following characterizations of associated vegetation are treated separately for foothills settings and for upper elevation settings.

Foothills habitats for Lesquerella sp. novum range from open Agropyron spicatum plant communities (Figure 5) to scrubby Cercocarpus ledifolius plant communities. Artemisia tridentata and Pinus flexilis approach co-dominance with the above, respectively, in at least one site each.

The particular plant communities where L. sp. novum occurs are substrate-specific, aridic forms of more widespread southwestern plant associations with the same species dominants as described by Mueggler and Stewart (1980) for Cercocarpus ledifolius/Agropyron spicatum h.t. and Agropyron spicatum/Poa sandbergii h.t. The exception is found in the Cercocarpus ledifolius plant community of Scudder Creek (002), which extends along an extensive ridge system.

Within these communities, L. sp. novum grows in the most open and exposed microhabitat between dominant canopy species. It appears to be widespread across the Scudder Creek site and the Emerine Gulch site. Plants commonly found to occur with L. sp. novum at one or more foothills locations include:

Achillea millefolium (yarrow)
Agropyron spicatum (bluebunch wheatgrass)
Artemisia frigida (fringed sage)
Artemisia tridentata (big sagebrush)
Cercocarpus ledifolius (mountain mahogany)
Chaenactis douglasii (hoary chaenactis)
Erigeron tweedyi (Tweedy's fleabane)
Eriogonum flavum (yellow buckwheat)
Gilia congesta (ballhead gilia)
Linum lewisii (blue flax)
Lesquerella alpina (alpine bladderpod)
Penstemon aridus (beardtongue)
Phlox muscoides (moss phlox)
Pinus flexilis (limber pine)
Poa secunda (Sandberg's bluegrass)
Senecio canus (woolly groundsel)
Townsendia hookeri (Hooker's townsendia)

In addition, the Scudder Creek population occurs with Arenaria kingii (King's arenaria) and the Emerine Gulch population occurs with Phlox kelseya var. missoulensis (Missoula phlox); both species are of state concern.

Subalpine and alpine habitats for Lesquerella sp. novum range from well-drained parkland (Figure 6) to sparsely-vegetated open slopes. The single documented site of subalpine habitat on BLM lands which was known and studied is in the Centennial Mountains.

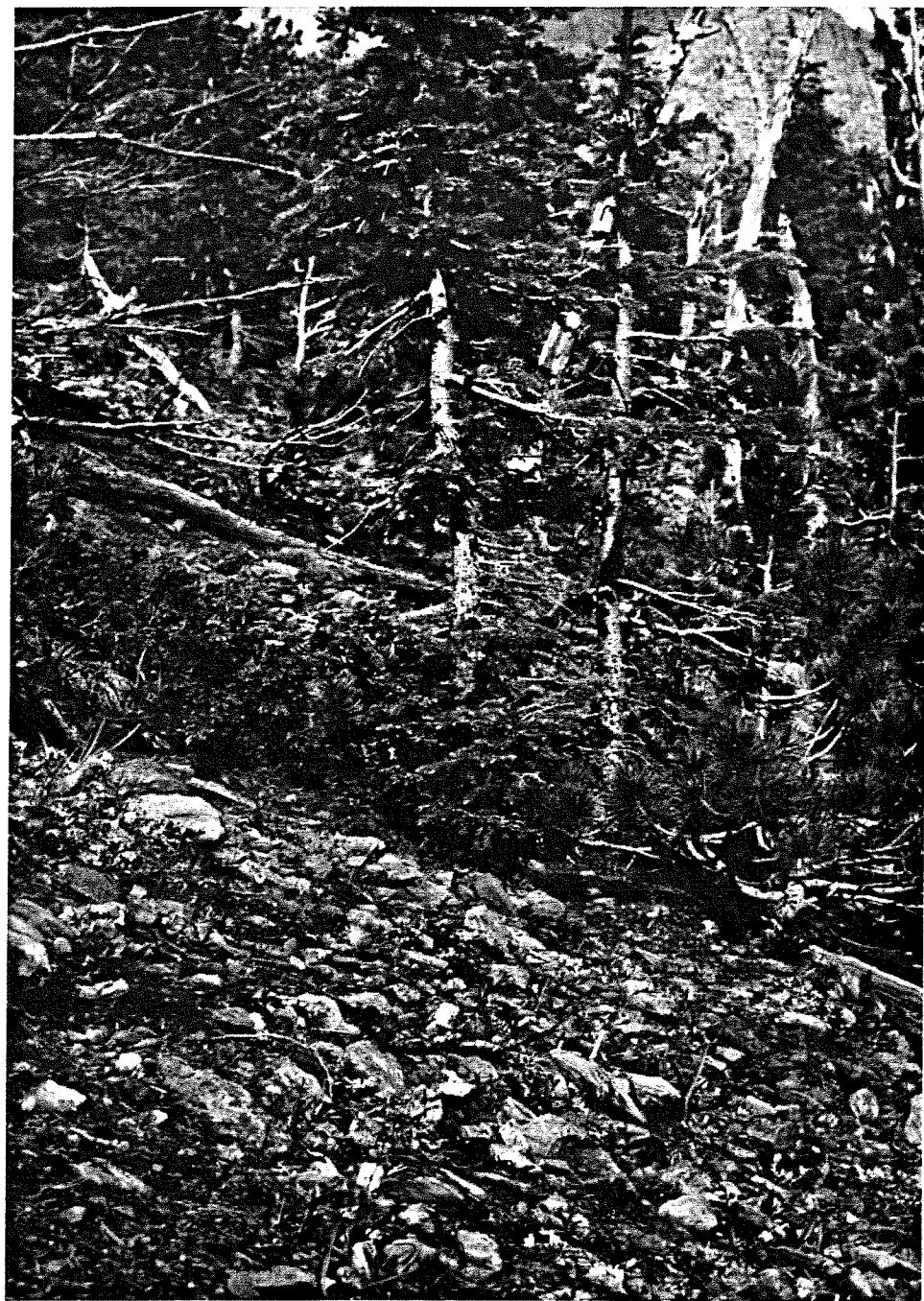
In the Centennial Mountains, Lesquerella sp. novum is found in a parkland setting of Pinus albicaulis - Abies lasiocarpa on north and east aspects, including openings and outcrop ridges dominated by Carex rossii and burned parkland with grass dominants. It extends down into Pseudotsuga menziesii - Carex geyeri association on the south aspect. Associated species include: Geum rossii, Poa alpina, Lloydia serotina, Valeriana dioica and Hedysarum sulphurescens.

In the Pioneer Mountains, the plant communities at different sites range from Picea engelmannii parkland with mesic species like Potentilla fruticosa and Zigadenus elegans to outcrop settings with Dryas octopetala, Eritrichium nanum, Silene acaulis, and Lesquerella alpina.

Figure 5. HABITAT PHOTO OF LESQUERELLA SP. NOVUM (BANNACK - 003)



Figure 6. HABITAT PHOTO OF LESQUERELLA SP. NOVUM (NEMESIS MT. - #004)



2. **TOPOGRAPHY:** Foothills sites are typically along ridges and steep breaks in the landscape associated with the relatively erosion-resistant limestone. The limestone outcrop habitat is most often at upper topographic intervals, from crest to midslope. Foothills populations range in elevation from 5600-7440'. The Emerine Gulch site (001) is at 5600'; while all other foothills sites are above 6320'.

Upper elevation sites are most often along eroding or wind-exposed slope settings, of varying grade. Subalpine populations range in elevation from 8600-9600 feet.

3. **SOIL RELATIONSHIPS:** Soils are calcareous and circumneutral orthents grading into aridisols at low elevations. Foothill sites are derived from Mission Canyon Formation dolomite of the Madison Group. They are derived from substrate consistently mapped on Ross et al. (1955) as part of undifferentiated Mississippian units; with possible exception of Emerine Gulch (001). Soils at subalpine sites in the Pioneer Mountains are also calcareous formations of the Madison Group (Ross et al. 1955). The Centennial Mountains site (004) is on substrate of quartzite parent material, mapped as Tertiary volcanic rock (Ross et al. 1955).

This species is calciphilic, but not altogether substrate-specific. The disparity between the calcareous settings of all records except the quartzite setting of Nemesis Mountain warrants further investigation.

4. **REGIONAL CLIMATE:** Although located west of the Continental Divide, populations of Lesquerella sp. novum have the dry continental influence, with precipitation centered in late spring and early summer. The three monitoring stations nearest them are at lower elevations and tend to be more moderate. Summary data is presented as follows on the next page (from USDC - NOAA 1982):

Climate conditions in the vicinity of Lesquerella sp. novum sites

	Annual ppt. (inches)	Temperature normals (ann.; F)	Temperature normals (June; F)	Temperature normals (Jan.; F)
Phillipsburg Ranger Stn. (5270')	14.22	54.8	69.9	31.0
Dillon FAA (5216')	9.53	55.9	73.0	30.8
Lakeview (6710')	20.52	48.7	66.3	22.6

The foothills and subalpine population sites have somewhat different climates (Carpio and Nielsen 1992), with the foothills sites having greatest continental influence. The growing season is shorter at high elevations, while the precipitation is greater compared to low elevation sites.

F. POPULATION DEMOGRAPHY AND BIOLOGY

1. **PHENOLOGY:** Flowering for foothills plants is typically between late May to late June in near-normal years. Flowering for subalpine plants is between early June to early July. Flowering is prolonged on the indeterminate inflorescences in years with moisture available throughout the flowering period.

The hot dry spring conditions in 1992 were followed by summer rains, so that all foothills flowering plants went into a second flowering in August. This is not considered to be a phenological norm, and it is not known whether they successfully produced seeds in the dry conditions of late August.

2. **POPULATION SIZE AND CONDITION:** Population sizes range from numbers of fewer than ten (003) to over 10,000 (001). The areas surrounding small populations have been incompletely searched, so the low counts represent preliminary figures.

Plants are considered to be relatively short-lived (Schassberger 1991), with populations making shifts in size and center between years. Few first-year plants were found in 1992 compared to the total number of plants in the population. It is thought that the early drought conditions of 1992 hampered seedling

establishment, marking a short-term downward population trend.

3. REPRODUCTIVE BIOLOGY

- a. **TYPE OF REPRODUCTION:** The flowers of *L. sp. novum* are chasmogamous. Cross-pollination and self-incompatibility are the norm for the genus as a whole (Rollins and Shaw 1973). No evidence of vegetative reproduction has been observed.
- b. **POLLINATION BIOLOGY:** Bees and flies are common pollinators in open habitat as occupied by the species, but no further species-specific information is available.
- c. **SEED DISPERSAL AND BIOLOGY:** Field observation indicate vigorous fruit set. The seeds lie close to the ground, and there are no apparent long-distance dispersal vectors.

G. POPULATION ECOLOGY

1. BIOLOGICAL INTERACTIONS

- a. **COMPETITION:** *L. sp. novum* occupies openings between the cover of community dominants and other upright plants. It is a plant of open conditions and the individual plants are widely spaced within a random pattern, so that it appears to be a poor competitor.
- b. **HERBIVORY:** None observed.

H. LAND OWNERSHIP

1. Foothills and upper elevation sites are on land administered by the Bureau of Land Management (Dillon Resource Area of the Butte District), two districts of the Beaverhead National Forest (Madison and Wise River Districts) and the Deerlodge National Forest (Phillipsburg District).

Ownership is summarized below:

001	Emerine Gulch	Deerlodge National Forest, Phillipsburg Ranger District
002	Scudder Creek	BLM, Butte District, Dillon RA
003	Bannack	BLM, "

H. LAND OWNERSHIP (cont.)

004	Nemesis Mt.	BLM, and Beaverhead Natl. Forest, Madison Ranger District
005	Black Mt. Rd.	Beaverhead Natl. Forest, Wise River Ranger District
006	Badger Pass	BLM, Butte District, Dillon RA
007	Black Lion Mt.	Beaverhead Natl. Forest, Wise River Ranger District
008	Lion Mt.	Beaverhead Natl. Forest, Wise River Ranger District and private

IV. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

A. THREATS TO CURRENTLY KNOWN POPULATION.

1. **GRAZING:** Lesquerella sp. novum occupies secondary range of varying forage value. Three of the sites are in grass-dominated communities (003, 004, and 005) grazed by livestock. While no plants appeared to be grazed, they are potentially affected by trampling of livestock. It is more frequently located in communities dominated by Cercocarpus ledifolius, which appear to have heavier levels of wildlife browse than livestock grazing.
2. **MINING:** The upper elevation sites in the East Pioneer Mountains are in the center of an area of intense metal mineralization where state mining activity is particularly concentrated (Perry 1962). One of the Lion Mountain subpopulations in the East Pioneer Mountains is near an active mine. Two active mines are located at approximately the same elevations and same apparent stratigraphy adjoining or across from two foothills subpopulations of Lesquerella sp. novum south of Badger Pass (006).

Mining claims are common in the vicinity of the Scudder Creek site (002), Bannack site (003), Lion Mt. site (007) and Black Lion Mt. site (008) as observed in the field and noted by Geach (1972). Many of the active mines lie along mineralized fault zones between quartzite and altered limestone, near the base of limestone slopes representing potential Lesquerella sp. novum habitat.

3. **TIMBER HARVESTING:** Logging is not taking place in Lesquerella sp. novum habitat at present. Only the upper elevation populations occur in or near timber. In these areas there are no signs of past logging activity, and there is limited interest in the low grade lumber with its difficult accessibility.
4. **WEED CONTROL ACTIVITIES:** Spotted knapweed (Centauraea maculosa) infestation is widespread and dense at the northernmost site on Deerlodge National Forest (001), particularly along the road at the base on the boundary. It is a potential invader at all foothills sites of Lesquerella sp. novum in Beaverhead County, though it was not found in or adjoining these populations.

Spring herbicide treatment using "Stinger" was initiated at Emerine Gulch in 1991 (Joy pers. commun.), followed by hand pulling of plants in 1992, and "Stinger" herbicide application again in May of 1993. Four belt transects (2' x 66') were set up in 1992 in areas with and without herbicide treatment to monitor impact.

- B. **MANAGEMENT PRACTICES AND RESPONSE:** The Emerine Gulch site is part of a proposed Botanical Special Interest Area (SIA) of the U.S. Forest Service, pending Regional Office approval. The SIA designation focuses management planning around the identified features of significance, which include both Lesquerella sp. novum and Phlox kelseya var. missoulensis in this case. The site is presently being managed as though it were a designated SIA (Joy pers. commun.).

In theory the Scudder Creek exclosure may provide an opportunity to compare plant densities with and without wildlife browse. However, the densities appear to be too low both inside and outside the immediate exclosure vicinity to monitor for response.

One area of the Centennial Mountains population was part of a wildfire burn area within the past ten years. In the parkland burn area, over half of the trees were dead. L. sp. novum numbers were higher than at a similar elevation setting, but the aspect was also different aspect (east vs. north).

- C. RECOMMENDATIONS FOR MAINTAINING VIABLE POPULATIONS:** It is recommended that mining permit activity at known locations of these species be waived pending further species assessment, and that mining permit activity in the vicinity of the six populations without boundary delimitation be addressed by early season surveys.
- D. RECOMMENDATIONS FOR FURTHER ASSESSMENT:** This species will be sought further in the course of Centennial Mountains, Dutchman Mountain and Tendoy Mountains field survey work on BLM land in 1993, completing part of the survey need. This will not meet the survey needs throughout the East Pioneer Mountains and foothills or in the Sapphire Mountains foothills. Pending complete survey work and publication of this species in the literature, it is recommended that the species status be reviewed and a demographic monitoring program be considered at the Scudder Creek site. It is recommended that this species be added to BLM and USFS lists of sensitive species in keeping with the need for further assessment and to ensure that populations are not inadvertently eliminated.

VII. LITERATURE CITED

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Appendix A. LIST OF AREAS SURVEYED - NEGATIVE RESULTS**Southeast end of the Tendoy Mountains****T.138 R.11W Section 25****T.148 R.11W Section 2****Southwest of Snowcrest Range****T.128 R.6W Sec. 35****T.138 R.6W Sec. 1****North of East Pioneer Mountains****T.1N R.11W Section 24****T.18 R.10W Sections 8, 12 NW 1/4****Central area in Centennial Mountains****T.15N R.1W Sections 6, 7, 8****T.15N R.2W Section 13****North of Clark Canyon Reservoir****T.98 R.10W Sections 29, 30**

Appendix B. ELEMENT OCCURRENCE PRINT-OUTS

April 7, 1993

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

24

Scientific Name: LESQUERELLA SP NOV 1
Common Name: UNDESCRIPTED BLADDERPOD

Global rank: G2T? Forest Service status:
State rank: S2 Federal Status:

Element occurrence code: PDBRANOV01.001
Element occurrence type:

Survey site name: EMERINE GULCH
EO rank: A
EO rank comments: LARGE POPULATION IN REMOTE AREA; HABITAT
IN GOOD SHAPE.

County: GRANITE

USGS quadrangle: MAUKEY GULCH

Township: Range: Section: TRS comments:
006N 016W 26 S2 ,NW4; 35 NE4NW4; 27 SE4NE4

Survey date: 1990-06-13 Elevation: 5600 -
First observation: 1966 Slope/aspect: 5-35% / SOUTH, SOUTHWEST
Last observation: 1990-06-13 Size (acres): 140

Location:

TAKE HWY 38 CA. 15 MILES FROM HWY 10A TO JUNCTION WITH ROCK CREEK
ROAD; PROCEED WEST ON 38 CA. 2.25 MILES TO EMERINE GULCH ROAD; SITE IS
ON HILL ABOVE ROAD.

Element occurrence data:

1990: POPULATION DENSITY CENTER SHIFTED, DUE TO THE SHORT LIVED NATURE
OF THIS PERENNIAL. 1989: 20,000+ INDIVIDUALS IN 9 SUBPOPULATIONS.

General site description:

STEEP, SOUTHWEST-FACING HILLSIDE, OCCASIONALLY SLUMPING CLAY-GRAVEL
SOIL; WITH AGROPYRON SPICATUM (DOMINANT), DELPHINIUM BICOLOR,
ERIOGONUM FLAVUM, PHLOX KELSEYI VAR. MISSOULENSIS, ARTEMISIA
TRIDENTATA, POA SANDBERGII, AND PHLOX MUSCOIDES. SOIL pH = 8.2 AS
MEASURED WITH COLOROMETRIC KIT. SITE IS TRAILED AND LIGHTLY GRAZED.

Land owner/manager:

DEERLODGE NATIONAL FOREST, PHILIPSBURG RANGER DISTRICT

Comments:

Information source:

SCHASSBERGER, L.A. 1990. FIELD SURVEYS OF GRANITE COUNTY OF 11-15 JUNE
(LESQUERELLA CARINATA, PHLOX KELSEYI VAR. MISSOULENSIS, AND CLAYTONIA
LANCEOLATA VAR. FLAVA).

April 7, 1993

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Specimens:

HARVEY, L. (7226). 1966. SPECIMEN #59195. MONTU. (DET. L. CARINATA BY K. LACKSCHEWITZ, 12/85).
LACKSCHEWITZ, K. (3688). 1972. MONTU.
LESICA, P. (3751). 1986. MONTU. (DET. L. PAYSONII BY R. ROLLINS, 11/90).
SCHASSBERGER, L. (368). GH. (DET. L. PAYSONII BY R. ROLLINS, 11/90; REDET. L. SP. NOVUM 3/93.)

April 7, 1993

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

25

Scientific Name: LESQUERELLA SP NOV 1
Common Name: UNDESCRIPTED BLADDERPOD

Global rank: G2T? Forest Service status:
State rank: S2 Federal Status:

Element occurrence code: PDBRANOV01.002
Element occurrence type:

Survey site name: SCUDDER CREEK
EO rank: A
EO rank comments: LARGE POPULATION; INTACT HABITAT.

County: BEAVERHEAD

USGS quadrangle: POLARIS

Township: Range: Section: TRS comments:
006S 012W 20 NE4NE4; 21 N2; 35 NE4NE4; 22 NE4NE4; 15 SE4SE

Survey date: 1992-06-24 Elevation: 6520 - 7440
First observation: 1992-06-24 Slope/aspect: 5-25% / SOUTH, EAST
Last observation: 1992-08-05 Size (acres): 20

Location:

FOOTHILLS OF EAST PIONEER MOUNTAINS. FROM POLARIS SCHOOL GO SOUTH CA.
2.5 MILES TO NEW SCUDDER CREEK ACCESS ROAD, THEN 1.5 MILES EAST.
ENCLOSURE IS ON RIDGE ABOVE TO THE SOUTHEAST.

Element occurrence data:

1000-5000 PLANTS, LOCALLY COMMON TO UNCOMMON, IN AT LEAST THREE MAJOR
SUBPOPULATIONS. IN LATE FRUIT ON 24 JUNE (UNSEASONABLY EARLY); IN
EARLY BUD 5 AUGUST FOR A SECOND TIME.

General site description:

OPEN SLOPES AMONG SCRUBBY RIDGES OF MADISON GROUP LIMESTONE, COVERED
MAINLY BY PINUS FLEXILIS-CERCOCARPUS LEDIFOLIUS/CAREX ROSSI
ASSOCIATION. POPULATION IS LOCATED MAINLY ON UPPER SLOPES AND RIDGE
CRESTS, IN ASSOCIATION WITH AGROPYRON SPICATUM, ARENARIA KINGII,
ERIGERON TWEEDYI, PENSTEMON ARIDUS, AND LESQUERELLA ALPINA.

Land owner/manager:

BLM: BUTTE DISTRICT, DILLON RESOURCE AREA

Comments:

OCCUPIES SAME HABITAT AS ARENARIA KINGII. ENCLOSURE ECODATA PLOT
RECORDED AS 91RD026. DET. LESQUERELLA SP NOVUM BY REED ROLLINS, 3/93.

Information source:

HEIDEL, B. 1992. [FIELD SURVEY TO SCUDDER CREEK EXCLOSURE OF 24 JUNE.]

Specimens:

HEIDEL, B. (698, 700, 704). 1992.

April 7, 1993

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

26

Scientific Name: LESQUERELLA SP NOV 1
Common Name: UNDESCRIPTED BLADDERPOD

Global rank: G2T? Forest Service status:
State rank: S2 Federal Status:

Element occurrence code: PDBRANOV01.003
Element occurrence type:

Survey site name: BANNACK
EO rank: CD

EO rank comments:

County: BEAVERHEAD

USGS quadrangle: BANNACK

Township: Range: Section: TRS comments:
008S 011W 05 SW4NW4

Survey date: 1992-06-25 Elevation: 6320 - 6400
First observation: 1992-06-25 Slope/aspect: 25% / WSW
Last observation: 1992-06-25 Size (acres):

Location:

DIRECTLY NORTHEAST ABOVE BANNACK TOWNSITE, ON RIDGE ABOVE HANGMAN'S GULCH.

Element occurrence data:

9 PLANTS, IN LATE FRUITING. RARE.

General site description:

LONG, STEEP, OPEN PRAIRIE SLOPE BELOW RIDGETOP; CERCOCARPUS LEDIFOLIUS COMMUNITY. IN AGROPYRON SPICATUM-ARTEMISIA TRIDENTATA ASSOCIATION, WITH LINUM LEWISII, HAPLOPAPPUS ACAULIS, ARTEMISIA FRIGIDA, ALLIUM TEXTILE, CAREX ROSSII.

Land owner/manager:

BLM: BUTTE DISTRICT, DILLON RESOURCE AREA

Comments:

DETERMINED LESQUERELLA SP NOVUM BY REED ROLLINS, 3/93.

Information source:

HEIDEL, B. 1992. [FIELD SURVEY OF BANNACK, BIG HOLE AND BADGER PASS AREAS OF 25 JUNE, 2 JULY AND 5 AUGUST.]

Specimens:

HEIDEL, B. (706). 1992.

April 7, 1993

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

27

Scientific Name: LESQUERELLA SP NOV 1
Common Name: UNDESCRIPTED BLADDERPOD

Global rank: G2T? Forest Service status:
State rank: S2 Federal Status:

Element occurrence code: PDBRANOV01.004
Element occurrence type:

Survey site name: NEMESIS MOUNTAIN
EO rank: A
EO rank comments: EXCELLENT SITE IN PROPOSED BLM
WILDERNESS AREA.

County: BEAVERHEAD

USGS quadrangle: MOUNT JEFFERSON

Township: Range: Section: TRS comments:
014S 002E 31 NW4, SW4NE4
014S 001E 36 NE4; 25 SE4

Survey date: 1992-07-26 Elevation: 8800 - 9200
First observation: 1979-06-20 Slope/aspect:
Last observation: 1992-07-26 Size (acres): 0

Location:

CENTENNIAL MOUNTAINS, NEMESIS MOUNTAIN AND EAST ALONG RIDGELINE.

Element occurrence data:

1992: AT LEAST 500-1000 PLANTS IN PEAK FLOWERING AND EARLY FRUITING ON
27 JUNE. 1979: RARE.

General site description:

ALPINE SCREE SLOPES AND BELOW TO PSEUDOTSUGA MENZIESII/CAREX GEYERI
HABITAT TYPE ON SOUTH FACE, IN PINUS ALBICAULIS-ABIES LASIOCARPA PLANT
ASSOCIATION INCLUDING BURNED AREA. OTHER ASSOCIATED SPECIES: CAREX
ROSSII, GEUM ROSSII, HEDYSARUM SULPHURESCENS, LLOYDIA SEROTINA, POA
ALPINA, VALERIANA DIOICA.

Land owner/manager:

BLM: BUTTE DISTRICT, DILLON RESOURCE AREA
BEAVERHEAD NATIONAL FOREST, MADISON RANGER DISTRICT

Comments:

LOWRY SPECIMEN TAKEN IN FLOWER, AND PREVIOUS YEAR'S FRUIT IS IN POOR
CONDITION; ROE SPECIMEN TAKEN IN FRUIT. DETERMINED LESQUERELLA SP
NOVUM BY REED ROLLINS, 3/93.

Information source:

LOWRY, II, P. P. 1979. VASCULAR PLANTS OF THE CENTENNIAL MOUNTAINS
INSTANT STUDY AREA. BLM, BUTTE DISTRICT. 57 PP.

April 7, 1993

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Specimens:

LOWRY, II, P. P. (2090). 1979. SPECIMEN #68303. MONT.
ROE, L. S. (493). 1992. GH.
HEIDEL, B. (721, 722). 1992.

April 7, 1993

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

28

Scientific Name: LESQUERELLA SP NOV 1
Common Name: UNDESCRIPTED BLADDERPOD

Global rank: G2T? Forest Service status:
State rank: S2 Federal Status:

Element occurrence code: PDBRANOV01.005
Element occurrence type:

Survey site name: BLACK MOUNTAIN ROAD
EO rank: BC
EO rank comments: LIMITED POPULATION SIZE.

County: BEAVERHEAD

USGS quadrangle: ERMONT

Township: Range: Section: TRS comments:
006S 011W 21 NE4

Precision: S
Survey date: 1992-08-05 Elevation: 6920 - 7120
First observation: 1992-08-05 Slope/aspect: 30% / WEST
Last observation: 1992-08-05 Size (acres):

Location:

FROM ARGENTA, FOLLOW THE ARGENTA ROAD NORTHWEST UP RATTLESNAKE CREEK
CA. 3.5 MILES. TAKE LEFT TOWARD ARGENTA GUARD STATIONS FOR CA. 1.25
MILES. TURN RIGHT ONTO BLACK MOUNTAIN ROAD. SITE IS ABOVE ROAD, CA.
0.3 MILE FROM TURN.

Element occurrence data:

50-100 PLANTS; MOST WITH FULL SET OF INFLORESCENCES, IN BUD FOR SECOND
TIME IN SEASON.

General site description:

OPEN SLOPE BELOW RIDGETOP. CERCOCARPUS LEDIFOLIUS COMMUNITY IN
AGROPYRON SPICATUM HABITAT TYPE, WITH HYMENOXYS ACAULIS, PENSTEMON
ARIDUS, PHLOX BRYOIDES AND LINUM LEWISII.

Land owner/manager:

BEAVERHEAD NATIONAL FOREST, DILLON RANGER DISTRICT

Comments:

DETERMINED LESQUERELLA SP NOVUM BY REED ROLLINS, 3/93.

Information source: HEIDEL, B. 1992. [FIELD SURVEY NORTH OF BADGER
PASS OF 5 AUGUST.]

Specimens: HEIDEL, B. (942). 1992.

April 7, 1993

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

29

Scientific Name: LESQUERELLA SP NOV 1
Common Name: UNDESCRIPTED BLADDERPOD

Global rank: G2T? Forest Service status:
State rank: S2 Federal Status:

Element occurrence code: PDBRANOV01.006
Element occurrence type:

Survey site name: BADGER PASS
EO rank: A
EO rank comments: LARGE POPULATION.

County: BEAVERHEAD

USGS quadrangle: BANNACK

Township: Range: Section: TRS comments:
007S 011W 27 NW4SE4; 28 N2NE4

Survey date: 1992-08-05 Elevation: 6660 - 7200
First observation: 1992-08-05 Slope/aspect: 10-25% / SOUTH
Last observation: 1992-08-05 Size (acres):

Location:

FROM HWY 278 AT BADGER PASS, TAKE UNPAVED ROAD SOUTH AND SOUTHWEST CA. 3 MILES. POPULATIONS ARE LOCATED CA. 0.25 MILE TO THE SOUTHEAST, AND CA. 0.5 MILE TO THE NORTHWEST.

Element occurrence data:

500-1000 PLANTS; BUDDED AND ENTERING FLOWERING.

General site description:

TWO DISCRETE SETTINGS, WITH THE LARGE SUBPOPULATION AT SOUTH POINT OUTCROP OF PARTIALLY FORESTED RIDGE, ASSOCIATED WITH CERCOCARPUS LEDIFOLIUS, HYMENOXYS ACAULIS, ERIGERON TWEEDYI AND AGROPYRON SPICATUM, SURROUNDED BY PINUS FLEXILIS. SMALLER SUBPOPULATION IS ON OPEN MIDSLOPE OUTCROP IN BARRENS ZONE MAINLY ABOVE CERCOCARPUS, WITH HYMENOXYS ACAULIS, GUTIERREZIA SAROTHRAE AND ERIGERON TWEEDYI.

Land owner/manager:

BLM: BUTTE DISTRICT, DILLON RESOURCE AREA
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:

SIMILAR POTENTIAL HABITAT CAN BE SEEN FROM A DISTANCE ALONG BANNACK ROAD. LOCAL MINING ACTIVITY SEEMS FOCUSED AROUND LIMESTONE OUTCROP POTENTIAL HABITAT, SIGNIFYING POSSIBLE THREAT. DETERMINED LESQUERELLA SP NOVUM BY REED ROLLINS, 3/93.

Information source:

HEIDEL, B. 1992. [FIELD SURVEY TO BADGER PASS OF 5 AUGUST.]

Specimens:

HEIDEL, B. (938). 1992.

April 7, 1993

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

30

Scientific Name: LESQUERELLA SP NOV 1
Common Name: UNDESCRIPTED BLADDERPOD

Global rank: G2T? Forest Service status:
State rank: S2 Federal Status:

Element occurrence code: PDBRANOV01.007
Element occurrence type:

Survey site name: BLACK LION MOUNTAIN
EO rank:
EO rank comments:

County: BEAVERHEAD

USGS quadrangle: VIPOND PARK

Township: Range: Section: TRS comments:
002S 011W 29

Survey date: Elevation: 9200 -
First observation: 1991-07-24 Slope/aspect:
Last observation: 1991-07-24 Size (acres):

Location:
NORTH OF BLACK LION MOUNTAIN.

Element occurrence data:
COMMON.

General site description:

BARREN CALCAREOUS SOIL ON EAST-FACING SLOPE OF RIDGE; ASSOCIATED WITH
LESQUERELLA ALPINA, DRYAS OCTOPETALA, AND SAXIFRAGA OPPOSITIFOLIA.

Land owner/manager:
BEAVERHEAD NATIONAL FOREST, WISE RIVER RANGER DISTRICT

Comments:
DETERMINED LESQUERELLA SP NOVUM BY REED ROLLINS, 3/93.

Information source:
LESICA, P. DIVISION OF BIOLOGICAL SCIENCES, UNIV. OF MONTANA,
MISSOULA, MT 59812.

Specimens:
LESICA, P. (5522) AND S. COOPER. 1991. MONTU.

April 7, 1993

MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

31

Scientific Name: LESQUERELLA SP NOV 1
Common Name: UNDESCRIPTED BLADDERPOD

Global rank: G2T? Forest Service status:
State rank: S2 Federal Status:

Element occurrence code: PDBRANOV01.008
Element occurrence type:

Survey site name: LION AND KEOKIRK MOUNTAINS
EO rank:
EO rank comments:

County: BEAVERHEAD

USGS quadrangle: MOUNT TAHEPIA

Township: Range: Section: TRS comments:
003S 011W 02 10

Precision: M
Survey date: Elevation: 8600 - 9600
First observation: 1991-07-24 Slope/aspect:
Last observation: 1991-07-25 Size (acres):

Location:

TWO LOCALITIES: ABOVE TRAPPER CREEK, JUST SOUTH OF HECLA MINE AT 8600', AND TOP OF KEOKIRK MOUNTAIN AT 9600'. ALSO OBSERVED BETWEEN LION AND SHERIFF MOUNTAINS; PRECISE LOCATION NOT KNOWN.

Element occurrence data:

COMMON AT BOTH LOCALITIES.

General site description:

OPEN CALCAREOUS SOIL IN OPEN SPRUCE WOODS ON SOUTH-FACING SLOPE; ASSOCIATED WITH POTENTILLA FRUTICOSA AND ZIGADENUS ELEGANS AT 8600', AND ON GENTLE EAST-FACING SLOPE NEAR CONTACT ZONE BETWEEN CRYSTALLINE AND CALCAREOUS ROCK, ASSOCIATED WITH SILENE ACAULIS AND ERYTHRICHIUM NANUM (KEOKIRK MOUNTAIN).

Land owner/manager:

BEAVERHEAD NATIONAL FOREST, WISE RIVER RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

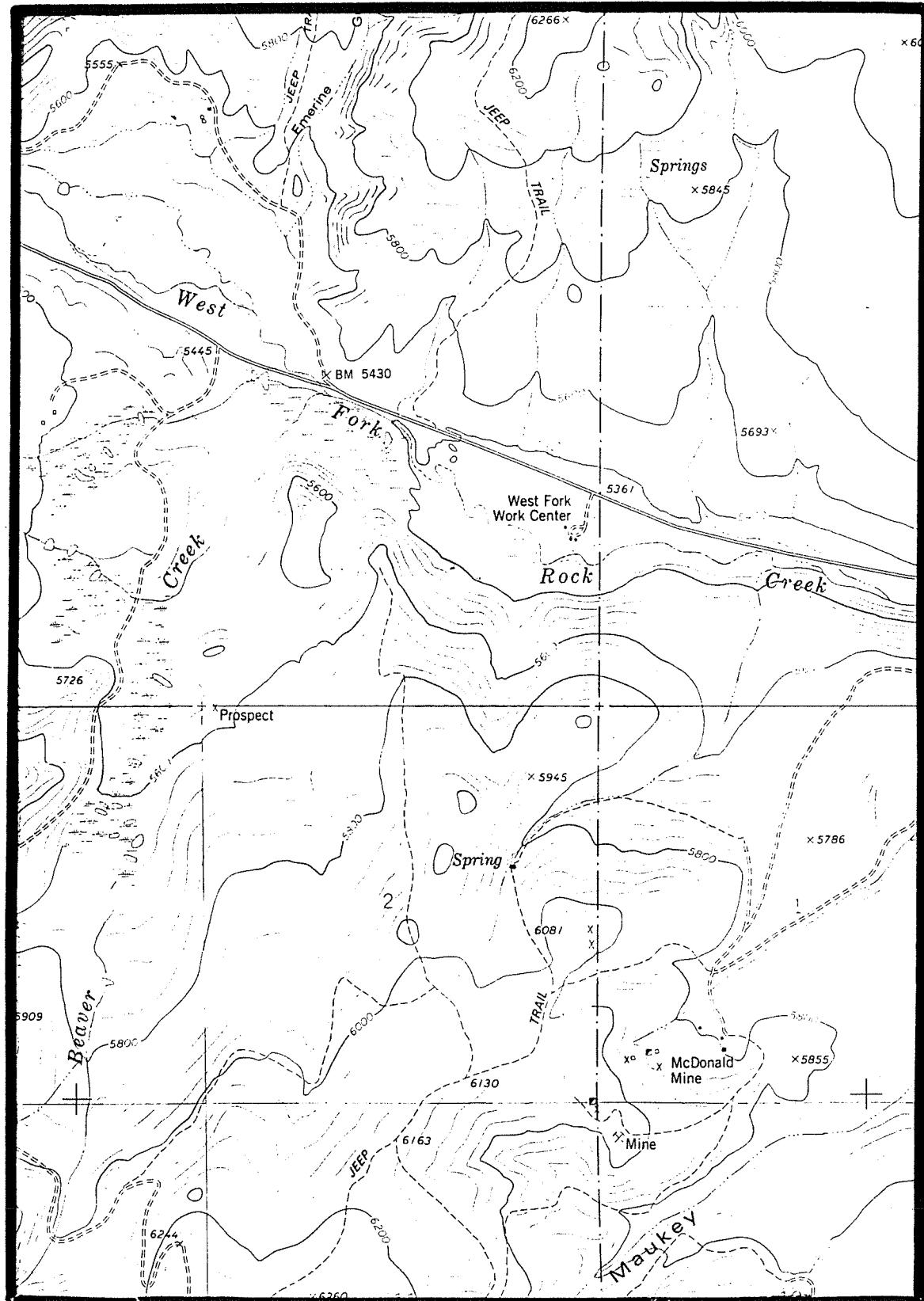
Comments:

MAY OCCUR ON PRIVATE INHOLDINGS WITHIN NATIONAL FOREST. DETERMINED LESQUERELLA SP NOVUM BY REED ROLLINS, 3/93.

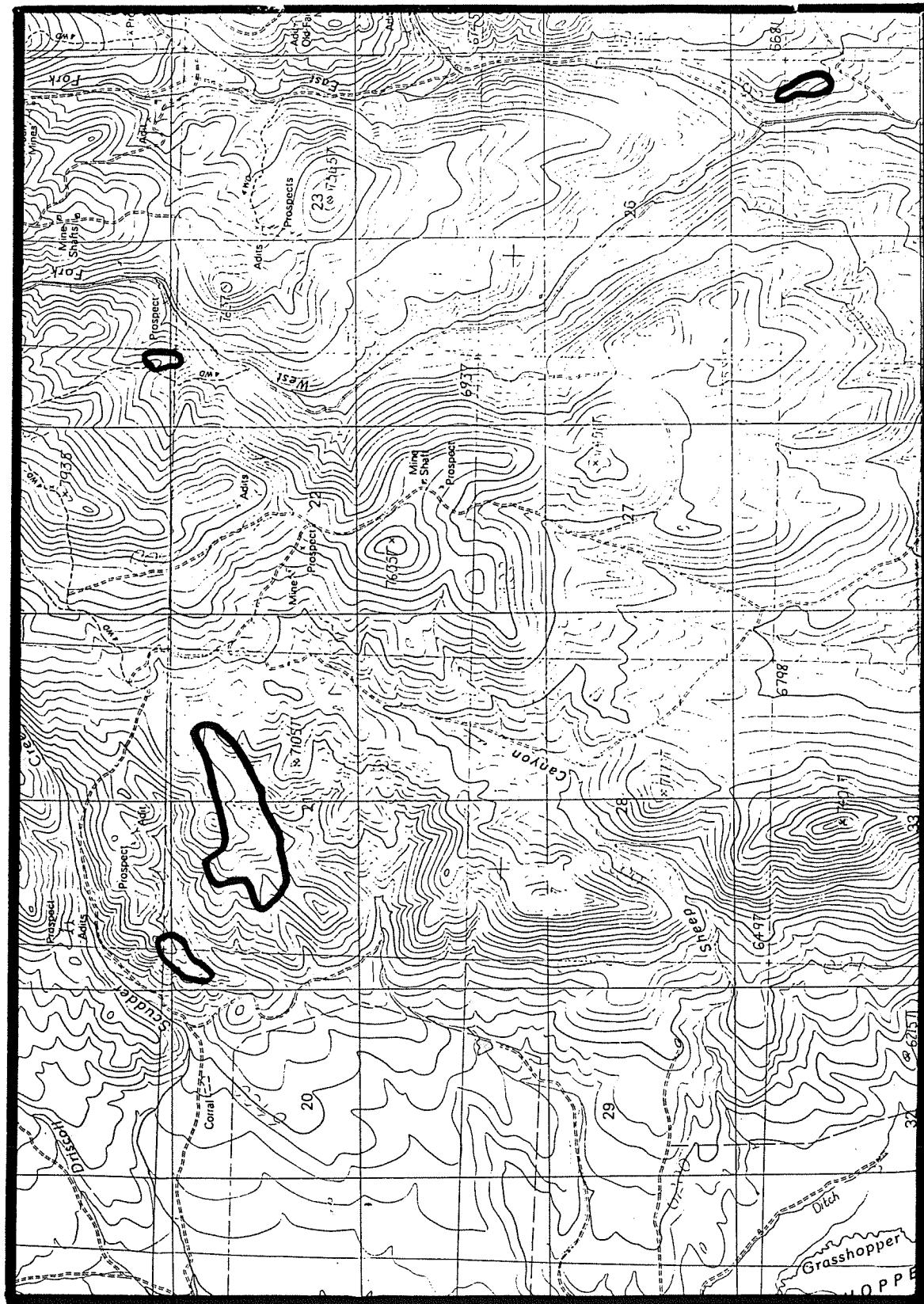
Information source: LESICA, P. DIVISION OF BIOLOGICAL SCIENCES, UNIV. OF MONTANA, MISSOULA, MT 59812.

Specimens: LESICA, P. (5525, 5528) AND S. COOPER. 1991. MONTU.

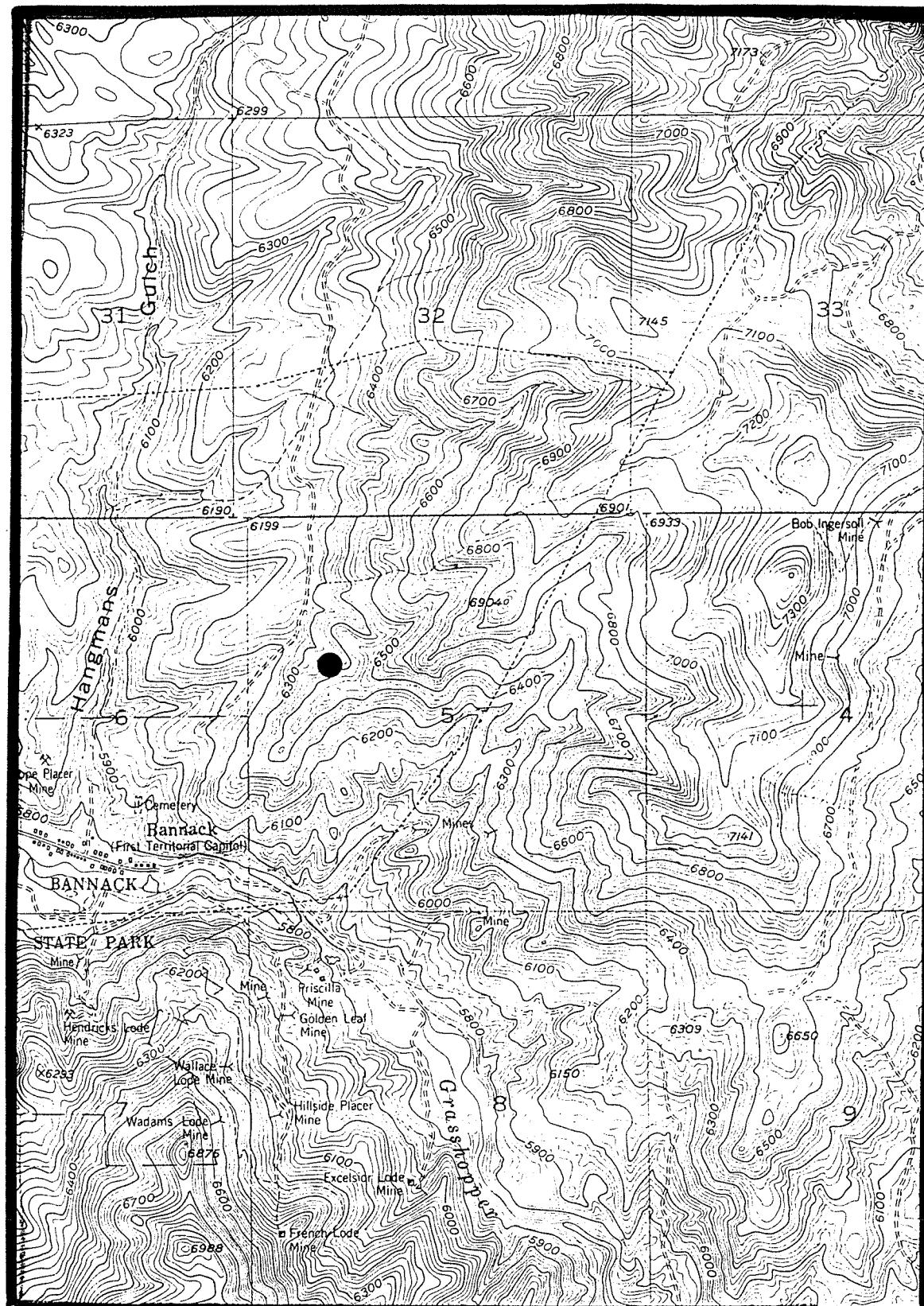
Appendix C. ELEMENT OCCURRENCE MAPS



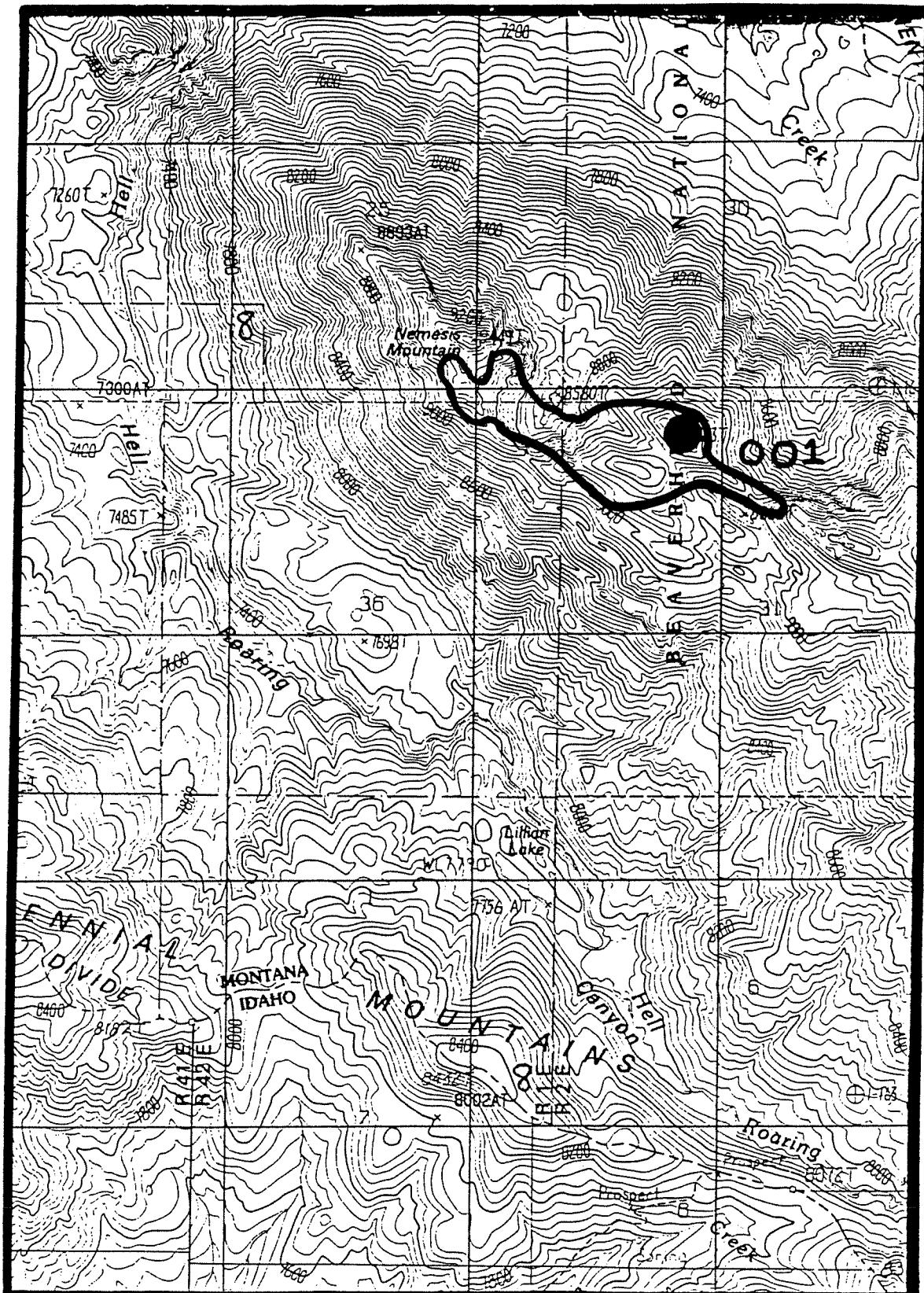
U. S. G. S. Maukey Gulch Quadrangle (7.5')
Lesquerella sp. novum - Emericine Gulch (001)



U. S. G. S. Polaris quadrangle (7.5')
Lesquerella sp. novum - Scudder Creek (002)

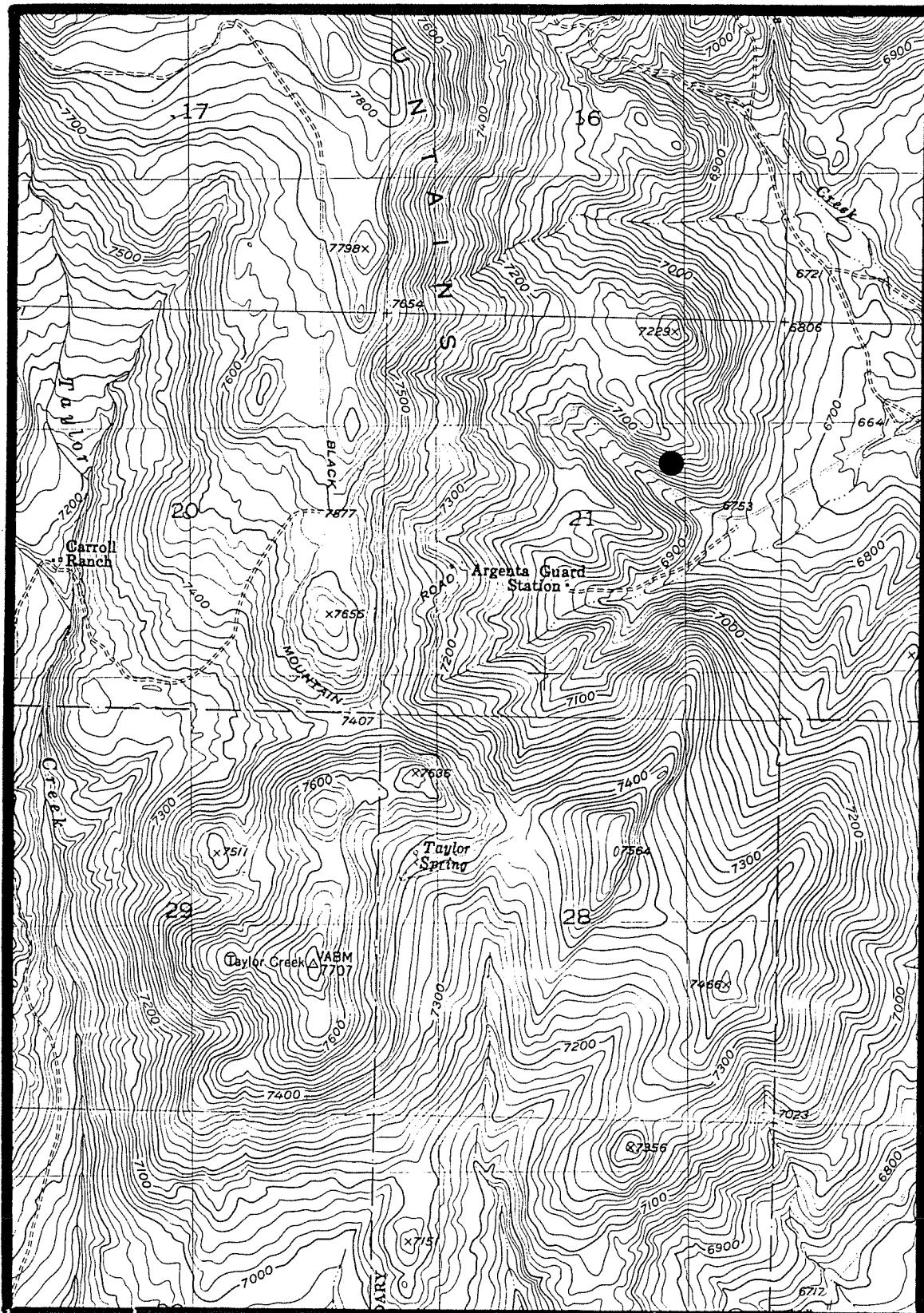


U. S. G. S. Bannack Quadrangle (7.5')
Lesquerella sp. novum - Bannack (003)

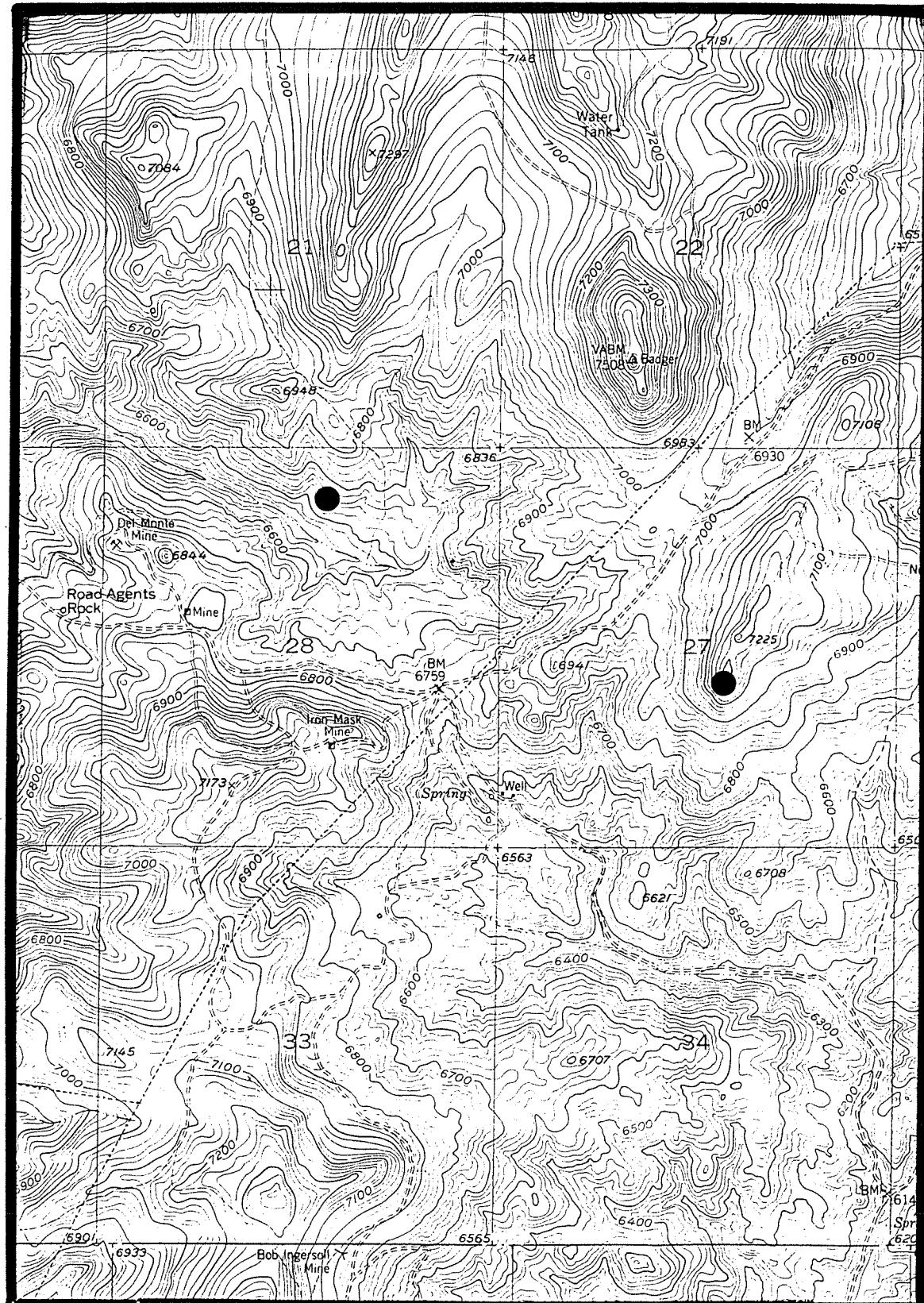


U.S.G.S. Mount Jefferson Quadrangle (7.5')

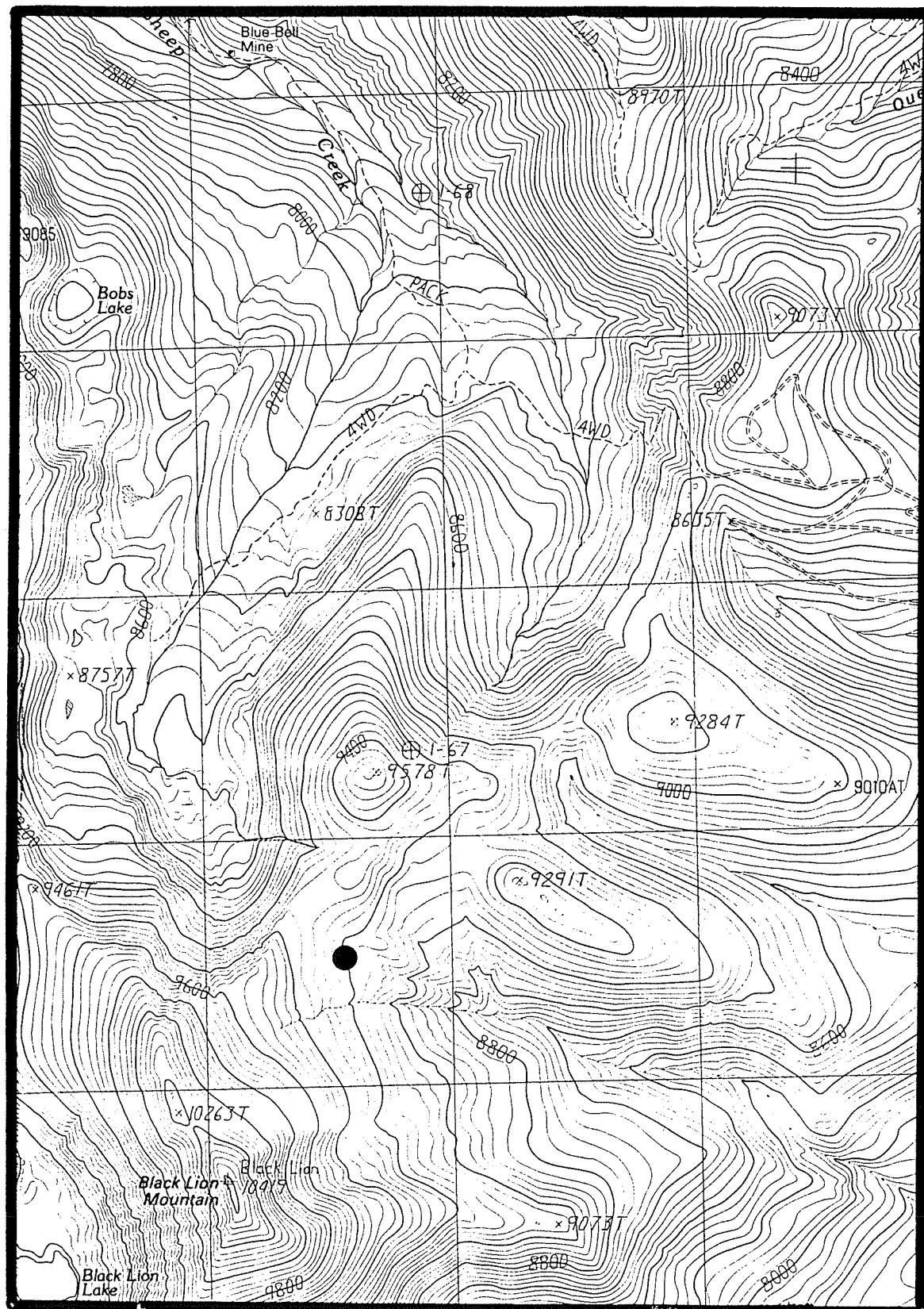
Lesquerella carinata - Nemesis Mountain (001)



U. S. G. S. Ermont Quadrangle (7.5')
Lesquerella sp. novum - Black Mountain Road (005)

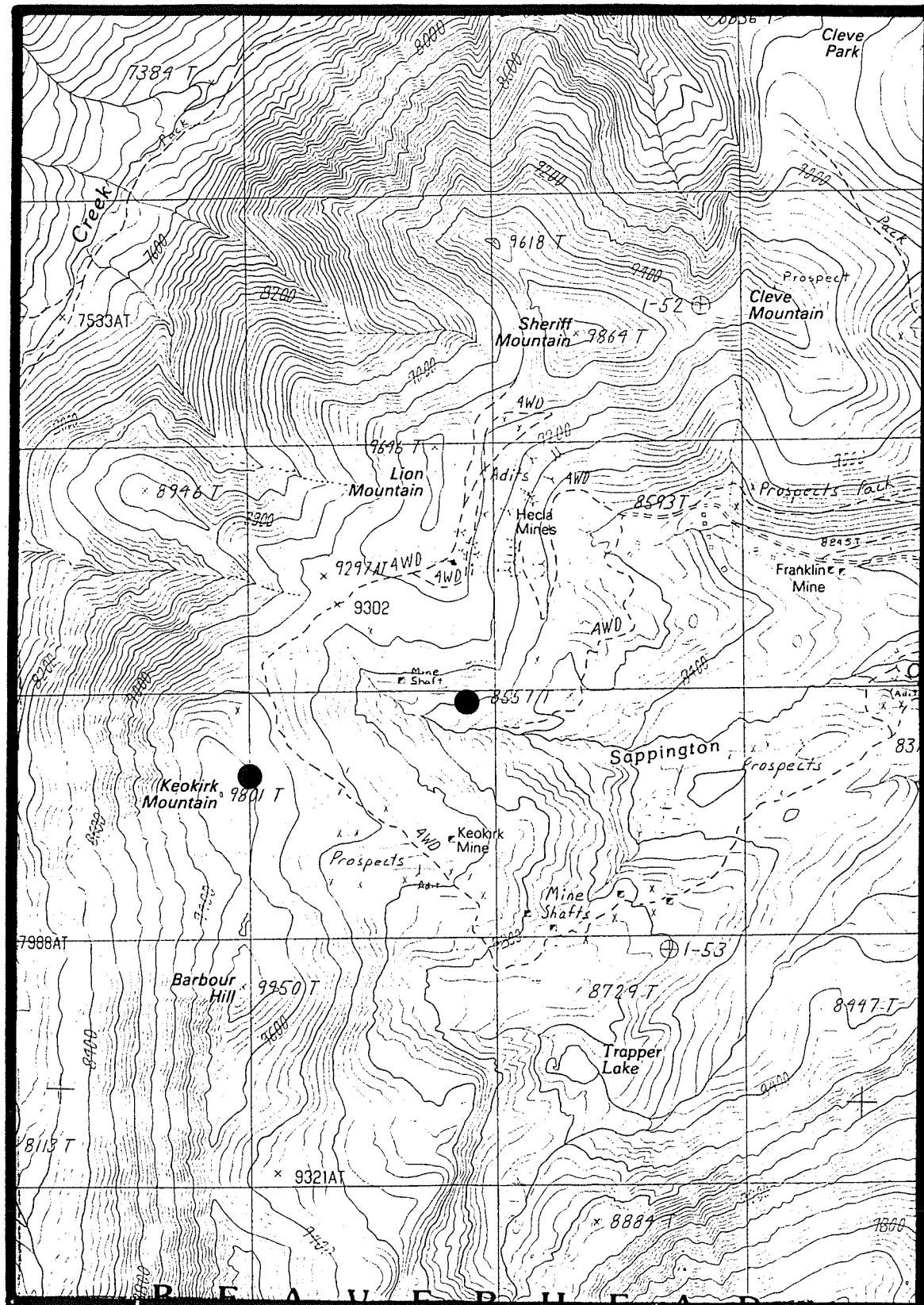


U. S. G. S. Bannack Quadrangle (7.5')
Lesquerella sp. novum - Badger Pass (006)



U. S. G. S. Vipond Park Quadrangle (7.5')

Lesquerella sp. novum - Black Lion Mountain (007)



U. S. G. S. Mount Tahepia Quadrangle (7.5')

Lesquerella sp. novum - Lion and Keokirk Mountains (008)

Appendix D. SUMMARY OF INFORMATION ON OTHER SPECIES OF CONCERN

Three other species of state concern are found at Lesquerella sp. novum sites, including one species found to be common which has subsequently been taken off the state list. Five more species of state concern have been documented from townships encompassing Lesquerella sp. novum sites but were not encountered in the course of 1992 survey.

Lesquerella sp. novum directly overlaps in habitat with Arenaria kingii (G4S1) over the large Scudder Creek population area (Heidel (#696) MONT, MONTU). The Arenaria kingii was previously collected along Grasshopper Creek south of Bannack, within one mile of the Bannack Lesquerella sp. novum site, and there is likely to be direct habitat overlap if the local extent of both species were surveyed. Arenaria kingii is known from a total of four records in Montana, restricted to Beaverhead County. At Scudder Creek it has a broader ecological amplitude than Lesquerella sp. novum, extending into partially wooded areas under Pinus flexis cover at the Scudder Creek site. Flowering material is needed for definitive identification of this species, and only the Scudder Creek site was visited early enough for confirmation.

A new location of Orobanche corymbosa (G4S2) was found in the immediate vicinity of the Scudder Creek site, situated in meadow bottom habitat below and near the edge of ridges that harbor both of the aforementioned species.

Other state species of special concern have previously been documented from the same sections or townships as Lesquerella sp. novum populations. Only one of them, Townsendia spathulata (G3S3), is restricted to limestone substrate. The other four species include:

- Astragalus scaphoides (G3S1)
- Delphinium geyeri (G5S1)
- Pediocactus simpsoni (G4S1)
- Penstemon lemhiensis (G3S2)

In the effort to expand known distribution of Lesquerella sp. novum in the Centennial Mountains, a particularly large population of Balsamorhiza macrophylla (G3G5S1) was located (Heidel (#754) MONT). Ranunculus jovis (G4G5S1S2) was previously collected in the same area (Dorn (#334, #402) RM) but could not be relocated. Collections and observation were made of Ligisticum filicinum (Heidel (#724) MONT) en route to the Nemesis Mountain site and over the course of expanded inventory, documenting its breadth of habitat and relative abundance, and providing basis for dropping it from the state list of species of concern.

In addition, Phlox kelseya var. missoulensis has been collected (Lackschewitz (#3502) MONTU; Lesica (#3752) MONTU) from the Emerine Gulch site for Lesquerella sp. novum (001).